REMARKS

Claims 18-59 are in the application.

The drawings are rejected because Figs. 1-6B were not labeled "Prior Art". Revised sheets of Figs. 1-6B are provided which comply with this requirement. The drawings have each been labeled "Replacement Sheet".

New Figures 10 and 11 are provided. Fig. 10 finds antecedent basis in claim 18, and Fig. 11 finds antecedent basis in claims 21, 31, 32 and 39. A corresponding amendment to page 33 is presented to reference these new drawings.

Claims 18-59 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement.

A thermodynamic analysis is a quantitative analysis of a system in accordance with the laws of thermodynamics. In this case, the system is a refrigeration system. It is believed that the phrase "thermodynamic analysis" is well known to those of ordinary skill in the art, and therefore its use is not overly ambiguous. Wikipedia provides a relevant entry, a copy of which is attached hereto. Note the correspondence of Fig. 2 of the Wikipedia entry with Fig. 6B of the present application. Because a thermodynamic analysis must comply with the laws of thermodynamics, and respond to environmental inputs and outputs, all proper thermodynamic analyses comprise essentially equivalent considerations, and there is no need to detail the conduct of such an analysis to a person or ordinary skill. It is further noted that the specification references a number of sources which help define, to the extent necessary, the meaning of the claim phrases. See, e.g., Thome, J.R., "Comprehensive Thermodynamic Approach to Modelling Refrigerant-Lubricating Oil Mixtures", Intl. J. HVAC&R Research (ASHRAE) 1995, 110-126; and Poz, M. Y., "Heat Exchanger Analysis for Nonazeotropic Refrigerant Mixtures", ASHRAE Trans. 1994, 100(1)727-735 (Paper No. 95-5-1). Pages 35-36 of the specification describe the basis for the thermodynamic analysis, while the thermodynamic analysis is described generally throughout the background and summary of the invention.

A consistency analysis is an analysis of a model of a refrigeration system, that is, one which seeks to reconstruct the system from the understood characteristics components and stated parameters and perturbations, as compared to the performance of the actual system being modeled. The consistency or lack thereof provide an indication that the actual system differs or deviates from the model. An inconsistency may reveal that any actual measurements agree with

parameters theoretically derived from the model, and the system configuration has not changed, or that the thermodynamic parameters of the system themselves have changed. This, in turn, leads to the possibility of determining that a repair or remediation is appropriate in order to restore the system to a known-good state. Thus, the consistency analysis provides a basis for determining when a repair or maintenance procedure is useful, and indeed since the analysis is potentially quantitative and based on the laws of thermodynamics, the consistency analysis may also predict a potential quantitative benefit from the proposed service or maintenance, permitting a cost-benefit analysis. See page 15, line 24-page 15, line 11:

> According to another embodiment of the invention, a set of state measurements are taken of the refrigeration system, which are then analyzed for self-consistency and to extract fundamental parameters, such as efficiency. Self-consistency, for example, assesses presumptions inherent in the system model, and therefore may indicate deviation of the actual system operation from the model operation. As the actual system deviates from the model, so too will the actual measurements of system parameters deviate from their thermodynamic theoretical counterparts. For example, as heat exchanger performance declines, due for example to scale accumulation on the tube bundle, or as compressor superheat temperature increases, for example due to non-condensable gases, these factors will be apparent in an adequate set of measurements of a state of the system. Such measurements may be used to estimate the capacity of the refrigeration system, as well as factors which lead to inefficiency of the system. These, in turn, can be used to estimate performance improvements which can be made to the system by returning it to an optimal state, and to perform a cost-benefit analysis in favor of any such efforts.
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> Typically, before extensive and expensive system maintenance is performed, it is preferable to instrument the system for real time performance monitoring, rather than simple state analysis. Such real time performance modeling is typically expensive, and not a part of normal system operation; whereas adequate information for a state analysis may be generally available from system controls. By employing a real time monitoring system, analysis of operational characteristics in a fluctuating environment may be assessed.

It is believed that this passage, in context, supports the claimed invention of inputting measurements of thermodynamically relevant parameters, and analyzing these with respect to the system configuration and the laws of thermodynamics, i.e., a thermodynamic analysis, to yield a thermodynamic model. Further, the thermodynamic model may be analyzed with respect to operating parameters to determine a consistency, i.e., a consistency analysis. It is therefore respectfully submitted that applicant has provided an adequate written description of the invention as claimed, and in particular, the consistency analysis.

It is therefore believed that the application as filed, including specification, claims, abstract and drawings, adequately supports the full disclosure of a thermodynamic analysis and a consistency analysis of the type set forth in the claims, and thereby complies with the requirements of 35 U.S.C. § 112, first paragraph.

Claims 18-59 are also rejected under 35 U.S.C. § 112, first paragraph, as allegedly not being supported by an enabling specification, and in particular, for failing to enable the phrases "thermodynamic analysis", "consistency analysis", and "thermodynamic modeling". In general, the enabling support is similar with the support cited above with respect to the written description rejection. However, with respect to enablement, the examiner is required to propose a factual finding as to the level of skill in the art, and that a person with that defined level of skill would not have been enabled to practice the invention. In this case, the examiner has made a specific finding that Herbert (U.S. 7,139,564), a reference available to a person of ordinary skill, would render the invention obvious. Without acceding to the propriety of the rejection, it is noted that a single reference obviousness rejection of a set of claims is inconsistent with a finding that those same claims are obvious, since these allegations are legally and factually inconsistent. By positing the obviousness rejection, the examiner admits that a person of ordinary skill ***would have been enabled to practice the claimed invention*** in view of the knowledge of the prior art imputed to him. To the extent that the examiner concludes that applicant's own "admitted prior art" was unavailable to persons or ordinary skill in the art at the time the invention was made, and therefore do not reflect the subjective state and knowledge of such a person, applicants note that the art rejection, though based on applicants' admission, requires a motivation in the art to combine, and therefore if such information was not actually available to such persons, the obviousness rejection is defeated. Since the obviousness rejections are presumably well-reasoned, and the enablement rejection is merely conclusory, the latter should be withdrawn as being unsupported and contradictory. On the other hand, applicants have directly addressed the enablement rejection by particularly pointing to sections of the specification and otherwise the state of knowledge of a person of ordinary skill, and thus the enablement rejection fails in any case.

Claims 39 and 50 are rejected as being "grammatically awkward". Claims 39 and 50 have been amended to redress these deficiencies.

Claims 18-59 are rejected under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite.

Claims 18, 19, 20, 21, 25, 26, 29, 30, 39, 43, 44, 45, 46, 49 and 51 are amended to address formal issues raised by the examiner, and for other reasons.

Claims 18-59 are rejected under 35 U.S.C. § 103(a) as being obvious in view of Hebert (US 7,139,564) in view of applicant's admitted prior art.

Hebert teaches "The exemplary computer system support for field located HVAC technician/engineer is summarized as follows I. Purpose: To provide methodology whereby field located technician/engineer can utilize computer system to analyze field acquired [data], utilizing all available equipment, data, thermodynamic [data], electrical data, etc to provide analysis of field located equipment." Hebert implements a system and method where operational parameters of a HVAC/refrigeration system are compared to **nominal** values of the same type of system, to determine a deviation. Thus, while Hebert does discuss performing thermodynamic calculations of a particular system at a particular state, and determining whether these are consistent with the manufacturers' specifications for that type of system (Col. 12, lines 8-11; Col. 12, lines 30-34; Col. 13, lines 11-14), Hebert does not seek to determine the actual optimum state of a particular refrigeration system with respect to its own performance. In fact, the nominal optimum state of a refrigeration system is dependent on a number of factors and presumptions, as well as installation-specific characteristics, so that a comparison with nominal is of limited value and may lead to a correction of the refrigeration system to a less efficient operating state in some cases. Thus, the "model" of the refrigeration system, if any, created by Hebert is a theoretical one, and does not account for installation-specific issues, aging, and manufacturing variations. On the other hand, the present invention measures performance of a refrigeration system against the optimum for that system, and thus accounts for such considerations. Therefore, the present system and method are usable in "custom" installations and large industrial processes where nominal performance data simply do not exist.

The consistency analysis, admitted by the Examiner to be absent from Hebert, relates to a consistency of the measured performance of the refrigeration system with respect to modeled performance of that same refrigeration system. Hebert compares the measured performance of a refrigeration system to a theoretical performance criterion, and thus performs a different method

and achieves a different result. The consistency analysis therefore differs from the interpretation provided by the Examiner on page 7 of the Office Action.

Respectfully submitted,

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